HOUSATONIC RIVER BASIN

WOLCOTT, CONNECTICUT

WOODTICK RESERVOIR DAM
CT. 00294

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

DECEMBER 1978

UNCLASSIFIED

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ver program reads: Phase I Inspection Report, National Dam Inspection Program; wever, the official title of the program is: National Program for Inspection of n-Federal Dams; use cover date for date of report.

EY WORDS (Continue on reverse side if necessary and identify by block number)

AMS, INSPECTION, DAM SAFETY,
housatonic River Basin
olcott, Connecticut

BSTRACT (Continue on reverse side if necessary and identify by block number)

he Woodtick Reservoir Dam is a cyclopean masonry concrete gravity structure that s 282 ft. long and 55 ft. high with a 100 ft. wide spillway. Based on the visual nspection, past operational performance and hydraulic computations, the dam s judged to be in fair condition. The drainage area contributing to the dam is 57 square miles. The routed test flood peak outflow is 12,670 cfs which would vertop the dam by 3.1 ft.

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NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

Identification Number:	CT 00294
Name:	Woodtick Reservoir Dam
Town:	Wolcott
County and State:	New Haven, Connecticut
Stream:	Mad River
Date of Inspection:	September 26, 1978

BRIEF ASSESSMENT

The Woodtick Reservoir Dam is a cyclopean masonry concrete gravity structure that is 282 feet long and 55 feet high with a 100 foot wide spillway. It has an upper gate house with 20 inch and 30 inch blowoffs. The dam is classified as intermediate in size and has a high hazard potential based on downstream habitation.

Based on the visual inspection, past operational performance and hydraulic computations, the dam is judged to be in fair condition. There are areas which should be studied in order to monitor the dam's behavior such as seepage through the body and foundation, spalling and fissuring of the concrete surfaces and the internal state of the dam's body.

The drainage area contributing to the dam is 8.57 square miles. The routed test flood peak outflow (Probable Maximum Flood) is 12,670 cfs which would overtop the dam by 3.1 feet.

The project will pass only 35 percent of the test flood outflow before overtopping the dam.

Recommended measures to be undertaken by the owner include monitoring seepage, establishing periodic inspection programs and a detailed study of the spillway's capacity. The owner shall implement the recommendations and remedial measures described in Section 7 within two years after receipt of this Phase I Inspection Report.

Joseph F. Merluzzo
Connecticut P.E. #7639
Project Manager

Richard F. Lyon
Connecticut P.E. #8443
Project Engineer

This Phase I Inspection Report on Woodtick Reservoir Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

CHARLES G. TIERSCH, Chairman
Chief, Foundation and Materials Branch
Engineering Division

FRED J. RAVENS, Jr., Member
Chief, Design Branch
Engineering Division

SAUL COOPER, Member
Chief, Water Control Branch
Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigations and analyses involving topographic mapping, subsurface evaluations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify the need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I Inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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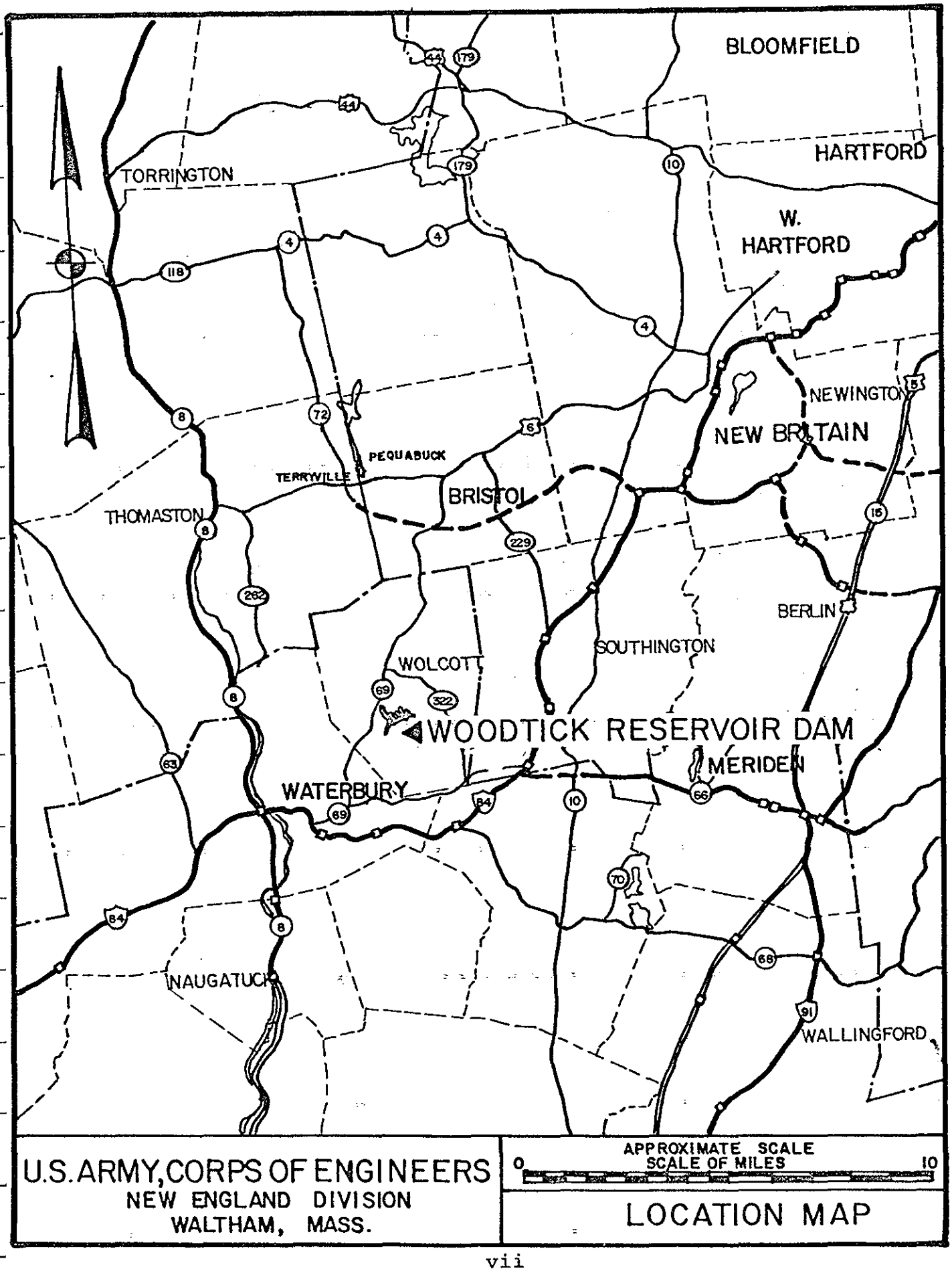
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TERRYVILLE
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THOMASTON
BERLIN
SOUTHINGTON
WOLCOTT
WOODTICK RESERVOIR DAM
MERIDEN
WATERBURY
NAUGATUCK
WALLINGFORD
U.S. ARMY, CORPS OF ENGINEERS
NEW ENGLAND DIVISION
WALTHAM, MASS.
APPROXIMATE SCALE
SCALE OF MILES
0
10
LOCATION MAP

PHASE I INSPECTION REPORT

WOODTICK RESERVOIR DAM CT 00294

SECTION 1 - PROJECT INFORMATION

1.1 General

a. Authority - Public Law 92-367, August 8, 1972 authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Storch Engineers has been retained by the New England Division to inspect and report on selected dams in the State of Connecticut. Authorization and notice to proceed were issued to Storch Engineers under a letter of May 3, 1978 from Ralph T. Garver, Colonel, Corps of Engineers. Contract No. DACW33-78-C-0000 has been assigned by the Corps of Engineers for this work.

b. Purpose -

(1) Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

(2) Encourage and prepare the states to initiate quickly, effective dam safety programs for non-Federal dams.

(3) To update, verify and complete the National Inventory of Dams.

1.2 Description of Project

a. Location - The Woodtick Reservoir Dam is located approximately three miles northeast of Waterbury in the Town of Wolcott, Connecticut (see Location Map).

b. Description of Dam and Appurtenances - The structure consists of a cyclopean masonry concrete gravity dam with a spillway width of 100 feet. There is a gate house with a 20 inch and 30 inch blowoff.

c. Size Classification - The size classification is intermediate. Both the height and storage (55 feet high and 2,325 acre-feet of storage) govern the size classification per criteria set forth in the Recommended Guidelines for Safety Inspection of Dams (Intermediate - 40 to 100 feet high and 1,000 to 50,000 acre-feet of storage) by the Corps of Engineers.

d. Hazard Classification - The hazard classification is high per the criteria set forth in the guidelines mentioned in Section 1.2.c above. Failure of the dam would result in the inundation of several residential dwellings and a considerable area of Waterbury, Connecticut (Appendix D, Plate 4).

e. Ownership - The dam and reservoir is owned by the Scoville Manufacturing Company, Waterbury, Connecticut.

f. Operator - The person in charge of day to day operation of the dam is Mr. Julian Abel, Chief Engineer, Scoville Manufacturing Company, Waterbury, Connecticut, 06702; Telephone Number: 757-6061.

g. Purpose of Dam - The Woodtick Reservoir serves as a source of water for industrial use by the Century Brass Company as well as for recreational purposes.

h. Design and Construction History - The Woodtick Reservoir Dam was constructed in 1917. There are no design computations available, however, two plan sheets which show details of construction were furnished by the Engineering Department of the Scoville Manufacturing Company.

i. Normal Operating Procedures - Regular operation of the dam is accomplished by maintenance personnel of the Century Brass Company. This includes opening and closing the blowoffs to regulate the flow for their use. Major maintenance is the responsibility of the Scoville Manufacturing Company.

1.3 Pertinent Data

a. Drainage Area - An 8.54 square mile drainage area contributes to the dam. The terrain is rolling with mixed amounts of farmland and residential development.

b. Discharge at Damsite - The maximum known spillway discharge was approximately 1,425 cfs during the flood of August, 1955.

(1) Outlet works: (conduits) size 20" and 30" at invert elevation 503.

(2) Maximum known flood at damsite: 1,425 cfs.

(3) Ungated spillway capacity at maximum pool elevation: 4,454 cfs at 529.5 elevation.

(4) Gated spillway capacity at pool elevation: N/A cfs at N/A elevation.

(5) Gated spillway capacity at maximum pool elevation: N/A cfs at N/A elevation.

(6) Total spillway capacity at maximum pool elevation: 4,454 cfs at 529.5 elevation.

c. Elevation (Feet above MSL)

(1) Top of dam: 529.5

(2) Maximum pool-design surcharge: 529.5

(3) Full flood-control pool: N/A

(4) Recreation pool: 525

(5) Spillway crest: 525

(6) Upstream portal invert diversion tunnel: 503

(7) Streambed at centerline of dam: 500

(8) Maximum tailwater: 505

d. Reservoir

(1) Length of maximum pool: 3,500 feet ±

(2) Length of recreation pool: 3,500 feet ±

(3) Length of flood-control pool: N/A

e. Storage (Acre-Feet)

(1) Recreation pool: 1,755

(2) Flood-control pool: N/A

(3) Design surcharge: 2,325

(4) Top of Dam: 2,325

f. Reservoir Surface (Acres)

(1) Top of Dam: 130

(2) Maximum pool: 130

(3) Flood-control pool: N/A

(4) Recreation pool: 130

(5) Spillway crest: 128

g. Dam

(1) Type: Concrete gravity

(2) Length: 282 feet

(3) Height: 55 feet ±

(4) Top Width: 6 feet

(5) Side Slopes: U/S - 1:0.05

D/S - 1:0.67

(6) Zoning: N/A

(7) Impervious Core: N/A

(8) Cutoff: unknown

(9) Grout curtain: unknown

(10) Other: N/A

h. Diversion and Regulating Tunnel

(1) Type: cast iron

(2) Length: 18 feet ±

(3) Closure: N/A

(4) Access: none

(5) Regulating Facilities: manually operated gates

i. Spillway

(1) Type: concrete-fixed weir

(2) Length of weir: 100 feet

(3) Crest elevation: 525

(4) Gates: none

(5) U/S Channel: underwater

(6) D/S Channel: underwater

(7) General: N/A

j. Regulating Outlets

Regulating outlets include a 30 inch and a 20 inch blowoff which discharges downstream. The blowoffs are regulated by manually operated gates.

(1) Invert: 503

(2) Size: 30 inch and 20 inch

(3) Description: cast iron

(4) Control Mechanism: manually operated gates

(5) Other: N/A

SECTION 2 - ENGINEERING DATA

2.1 Design

The facility was built in 1917. There is no design information available other than two contract drawings that were apparently used for construction. Conversations with engineering department's personnel of the Scoville Manufacturing Company told us that there has been no hydraulic or hydrologic analysis done for this facility. The basic information supplied for the dam is shown on the plates contained in Appendix B.

2.2 Construction

There are no records or photographs available of the 1917 construction.

2.3 Operation

The water level in this reservoir is controlled by blowoff valves that are in the gate house at the spillway of the reservoir. The valves are manipulated by hand operators.

2.4 Evaluation

a. Availability - Contract drawings by the Mad River Company, the owner of the dam when it was constructed, were readily available from the chief engineer at Scoville Manufacturing Company. Because of the age of the dam, there was no design information. The dam has no procedures in case of overtopping.

b. Adequacy - The information that was made available was only a minor factor in the assessment which was based mainly on the visual inspection, past performance history and hydrologic and hydraulic assumptions.

c. Validity - The contract drawings are accurate to the extent that the visual inspection did not reveal any new features.

SECTION 3 - VISUAL INSPECTION

3.1 Findings

a. General - The visual inspection was conducted on September 26, 1978 by members of the engineering staff of Storch Engineers. A copy of the visual inspection check list is contained in Appendix A of this report.

Before the inspection, contract drawings for the dam that had been done prior to the construction of this facility were made available from the Scoville Manufacturing Company. A compact sketch of the dam was made for orientation during the inspection (Appendix B, Plate 1).

In general, the overall appearance and condition of the dam is fair.

b. Dam - According to the plan sheets supplied from the Scoville Manufacturing Company, Engineering Department, the body of the dam is composed of cyclopean masonry. The crest of the dam has an emergency section (Appendix C, Photo 3) which is 40 feet long and 1 foot above the elevation of the regular spillway. There have been flash boards placed on top of both spillways (Appendix C, Photos 1 & 2).

About 10 years ago, C. W. Blakeslee & Sons, Inc. reconditioned the face of the entire dam. This work included a heavy duty epoxy sealer which now shows signs of steady

seepage (Appendix C, Photo 5) in several areas. The following are observations noted during the inspection:

1. Several cracks and spalling spots of concrete on surfaces of the spillway, non-overflow sections, outlet and the west wall of the gate house (Appendix C, Photos 2, 7 and 8).
2. Seepage through the concrete of the west abutment with a discharge of approximately 1 gallon per minute (Appendix C, Photo 5).
3. Seepage at a downstream portion of the east toe of the dam and the juncture of the dam's concrete and rock with discharges approximately 1 to 2 gallons per minute (Appendix C, Photos 6 and 7).

There are no signs of structural instability of the dam.

c. Appurtenant Structures - The appurtenant structures are the wooden service bridge over the emergency spillway and the attached gate house (Appendix C, Photo 3). An attempt was made to inspect the inside of the gate house, but the door was locked. The exterior of the gate house was in good condition. Maintenance personnel indicated that valves were operational, but there were some problems with vandalism in the area. The wooden bridge to the gate house that crosses over the emergency spillway shows some signs of damage such as a permanent warp from prior floods and some rotting timbers (Appendix C, Photo 3).

d. Reservoir Area - Inspection of the area adjacent to the embankment of the dam showed it to be a natural, rolling terrain. There were no visible signs of embankment movement at either end of the dam.

A small east dike was not inspected under the scope of work, however, there seems to be a potential for overtopping, based on past history of other floods.

e. Downstream Channel - The downstream channel of the spillway (Appendix C, Photo 4) is overgrown with trees with a series of smaller dams just downstream. Along the toe of the east side of the dam, there is an area on the bank which stays moist from the seepage flow through or under the body of the dam (Appendix C, Photo 6). There is also evidence of a seepage flow on the east bank in the area of the rock and concrete interface (Appendix C, Photo 7).

3.2 Evaluation

The general physical condition of the dam and appurtenant structures based on the visual inspection is fair. The observation of the extensive zone of seepage on the downstream slope of the dam indicates a need for further study so that the extent of this problem can be defined.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 Procedures

The responsibility for day to day maintenance is with the Century Brass Company of Waterbury with engineering assistance from the Scoville Manufacturing Company. There is no formal procedure for lowering the reservoir during periods of heavy rain. The reservoir is essentially kept at a level which satisfies the industrial demand of the manufacturing companies downstream.

4.2 Maintenance of Dam

The routine maintenance for this dam consists of keeping the wooden bridge to the gate house in functional condition. Items such as clearing the downstream area of trees and brush have not been undertaken for years. Some maintenance of the downstream channel has been done to accommodate a recreational and swimming area.

4.3 Maintenance of Operating Facilities

The valves are operated regularly to control the flow downstream, however, the door to the gate house was locked so the condition of this equipment could not be checked.

4.4 Description of Warning System

There is no warning system in effect.

4.5 Evaluation

In view of the lack of routine maintenance procedures, it is suggested that a complete program of maintenance be established. This program should include a clean-up of the downstream area as well as repair of damage to the body of the dam itself.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. Design Data - The 100 foot spillway and a 30 inch and a 20 inch blowoff are the only means of transmitting water past the dam. Under conditions of the test flood (Probable Maximum Flood), the spillway will carry only a portion of the flood water.

Using the guide curves supplied by the Corps of Engineers (rolling terrain), the test flood peak inflow into the reservoir is 14,520 cfs and the routed outflow is 12,670 cfs. The pond elevation at the test flood peak outflow is 532.6 or 3.1 feet over the top of the dam. The capacity of the spillway at the top of the dam is only 4,454 cfs, approximately 35 percent of the test flood peak outflow (Appendix D).

b. Experience Data - The Woodtick Reservoir Dam has experienced floods of November, 1927; March, 1936; September, 1938 and August (maximum) and October, 1955. During the flood of August, 1955, the elevation of the pond was 527.6 feet and the discharge was approximately 1,425 cfs.

c. Visual Observations - The spillway (Appendix C, Photo 1) at the time of the inspection was in fair condition with some evidence of water seeping through its construction joints.

The river channel immediately downstream is another lake, however, beyond that lake the channel is overgrown with trees and brush and is not conducive to the free passage of flood flows.

The 30 inch and 20 inch blowoff are in good condition.

d. Overtopping Potential - Calculations by Storch Engineers indicate that the test flood peak outflow will overtop the dam by 3.1 feet. However, since the dam is constructed of concrete, it may withstand some overtopping. One half of the test flood peak outflow would result in about one foot of overtopping.

SECTION 6 - STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations - There have been no routine inspections conducted by the resident staff of Scoville Manufacturing Company. In October, 1977, the dam was inspected by personnel of the State Department of Environmental Protection. This visual inspection discovered no significant negative changes in the condition of the dam. The dam's structural stability at the present time seems perfectly adequate except for the noted seepage areas.

b. Design and Construction Data - The only design and construction data were two drawings prepared by the design company in 1917.

c. Operating Records - There are no operating records for this facility. The water level of the Woodtick Reservoir Dam is not monitored.

d. Post Construction Changes - The only change since the completion of construction of the dam in 1917 was by C.W. Blakeslee & Sons, Inc. (about 10 years ago) and includes a heavy duty epoxy sealer on the face of the entire dam.

e. Seismic Stability - The dam is located in Seismic Zone 1 and in accordance with Recommended Phase I Guidelines does not warrant seismic analysis.

SECTION 7 - ASSESSMENT, RECOMMENDATIONS & REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition - After study of the available documents, the results of this inspection, the hydraulic computations and the meetings with the engineering staff of the Scoville Manufacturing Company, the conclusion is that the general condition of the Woodtick Reservoir Dam is fair. There is some concern about seepage through the dam and its foundation and the inadequate hydraulic capacity of the spillway.

b. Adequacy of Information - The information available is such that the assessment of the safety of the dam should be based primarily on the visual inspection results and its past operational performance.

c. Urgency - It is considered that the recommendations suggested below be implemented within two years after receipt of this Phase I Inspection Report.

d. Need for Additional Investigation - Additional investigations should be implemented by the owner as outlined in the following sections.

7.2 Recommendations

In view of the lack of engineering data for evaluating the condition of the dam and predicting its behavior in the

future, it is recommended that the following measures be undertaken by the owner:

a. Monitoring of the dam for seepage including any necessary seepage analyses or other pertinent studies.

b. Further detailed studies of the spillway capacity and an increase of the total project discharge capacity if necessary.

The above recommendations should be done by a qualified registered professional engineer or engineering firm.

7.3 Remedial Measures

It is considered important that the following items be attended to as early as practical.

a. Alternatives - Not applicable.

b. O & M Maintenance and Procedures -

1. Brush and trees on the downstream area at the distance of 10 feet from the toe of the dam should be removed to facilitate the visual observation of existing and potential seepage.

2. Weakened, damaged and fissured concrete of the dam should be repaired.

3. The gate house and equipment should be inspected and access to the gate house should be made readily available.

4. A systematic inspection program (once every two years) when the reservoir is at the highest and lowest water levels should be developed to assure that all features of the dam are continually maintained.

5. Plans for around-the-clock surveillance should be developed for periods of unusally heavy rains and a formal warning system should be provided for the event of an emergency.

APPENDIX A

VISUAL INSPECTION CHECK LIST A-1 to A-7

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

PROJECT Woodtick Reservoir Dam

DATE 9-26-78

TIME 11:00 a.m.

WEATHER Sunny

W.S. ELEV. 524.4± U.S. 502.5 DN.S.

PARTY:

1. Richard Lyon
2. Miron Petrovsky
3. Gary Giroux
4. John Schearer
5. Rodolfo Aloma
6.
7.
8.
9.
10.

PROJECT FEATURE	INSPECTED BY	REMARKS
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

PERIODIC INSPECTION CHECK LIST

PROJECT Woodtick Reservoir Dam DATE 9-26-78

PROJECT FEATURE _____ NAME R. Lyon

DISCIPLINE _____ NAME M. Petrovsky

AREA EVALUATED	CONDITIONS
DAM EMBANKMENT	
Crest Elevation	Good
Current Pool Elevation	Good
Maximum Impoundment to Date	Good
Surface Cracks	Minor hairline crack
Pavement Condition	N/A
Movement or Settlement of Crest	None observed
Lateral Movement	None observed
Vertical Alignment	None observed
Horizontal Alignment	None observed
Condition at Abutment and at Concrete Structures	Fair with some seepage noted
Indications of Movement of Structural Items on Slopes	N/A
Trespassing on Slopes	Not permitted
Sloughing or Erosion of Slopes or Abutments	Some minor areas due to natural drainage
Rock Slope Protection - Riprap Failures	None
Unusual Movement or Cracking at or near Toes	None observed
Unusual Embankment or Downstream Seepage	None observed
Piping or Boils	None
Foundation Drainage Features	None
Toe Drains	Functioning at the time of insp.
Instrumentation	None

PERIODIC INSPECTION CHECK LIST

PROJECT Woodtick Reservoir Dam DATE 9-26-78

PROJECT FEATURE NAME G. Giroux

DISCIPLINE NAME R. Aloma

AREA EVALUATED	CONDITION
DIKE EMBANKMENT	
Crest Elevation	EAST DIKE NOT INSPECTED
Current Pool Elevation	
Maximum Impoundment to Date	
Surface Cracks	
Pavement Condition	
Movement or Settlement of Crest	
Lateral Movement	
Vertical Alignment	
Horizontal Alignment	
Condition at Abutment and at Concrete Structures	
Indications of Movement of Structural Items on Slopes	
Trespassing on Slopes	
Sloughing or Erosion of Slopes or Abutments	
Rock Slope Protection - Riprap Failures	
Unusual Movement or Cracking at or near Toes	
Unusual Embankment or Downstream Seepage	
Piping or Boils	
Foundation Drainage Features	
Toe Drains	

PERIODIC INSPECTION CHECK LIST

PROJECT Woodtick Reservoir Dam DATE 9-26-78

PROJECT FEATURE _____ NAME J. Schearer

DISCIPLINE _____ NAME G. Giroux

AREA EVALUATED	CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	
a. Approach Channel	UNDERWATER
Slope Conditions	
Bottom Conditions	
Rock Slides or Falls	
Log Boom	
Debris	
Condition of Concrete Lining	
Drains or Weep Holes	
b. Intake Structure	
Condition of Concrete	Condition of exterior concrete
Stop Logs and Slots	good - door to gate house locked

PERIODIC INSPECTION CHECK LIST

PROJECT Woodtick Reservoir Dam DATE 9-26-78

PROJECT FEATURE NAME R. Aloma

DISCIPLINE NAME R. Lyon

AREA EVALUATED	CONDITION
OUTLET WORKS - CONTROL TOWER	
a. Concrete and Structural	
General Condition	Fair to good
Condition of Joints	Fair to good
Spalling	None observed
Visible Reinforcing	None observed
Rusting or Staining of Concrete	None observed
Any Seepage or Efflorescence	None observed
Joint Alignment	Good
Unusual Seepage or Leaks in Gate Chamber	Door locked could not observe
Cracks	Minor hairline cracks
Rusting or Corrosion of Steel	N/A
b. Mechanical and Electrical	
Air Vents	N/A
Float Wells	N/A
Crane Hoist	None observed door locked
Elevator	N/A
Hydraulic System	N/A
Service Gates	Underwater
Emergency Gates	N/A
Lightning Protection System	N/A
Emergency Power System	N/A
Wiring and Lighting System in	N/A

PERIODIC INSPECTION CHECK LIST

PROJECT Woodtick Reservoir Dam DATE 9-26-78

PROJECT FEATURE _____ NAME G. Giroux

DISCIPLINE _____ NAME J. Schearer

AREA EVALUATED	CONDITION
OUTLET WORKS - TRANSITION AND CONDUIT	
General Condition of Concrete	N/A
Rust or Staining on Concrete	Cast iron conduit
Spalling	
Erosion or Cavitation	
Cracking	
Alignment of Monoliths	Not observed
Alignment of Joints	Not observed
Numbering of Monoliths	Not observed

PERIODIC INSPECTION CHECK LIST

PROJECT Woodtick Reservoir Dam DATE 9-26-78

PROJECT FEATURE _____ NAME M. Petrovsky

DISCIPLINE _____ NAME R. Lyon

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	
General Condition	Good
Loose Rock Overhanging Channel	N/A
Trees Overhanging Channel	N/A
Floor of Approach Channel	Underwater
b. Weir and Training Walls	
General Condition of Concrete	Good
Rust or Staining	Some (See Photos)
Spalling	Minor
Any Visible Reinforcing	None observed
Any Seepage or Efflorescence	Minor
Drain Holes	N/A
c. Discharge Channel	
General Condition	Good
Loose Rock Overhanging Channel	Some (See Photos)
Trees Overhanging Channel	Fairly overgrown with several
Floor of Channel	trees (large) under several feet
Other Obstructions	of water

APPENDIX B

LIST OF REFERENCES

1. Drawings of Woodtick Reservoir Dam: (1) Plan Profile; (2) Gate Chamber; The Mad River Company; Waterbury, Connecticut; September, 1917.

2. Recommended Guidelines for Safety Inspection of Dams; Department of the Army; Office of Chief of Engineers; Washington, D.C.; November, 1976.

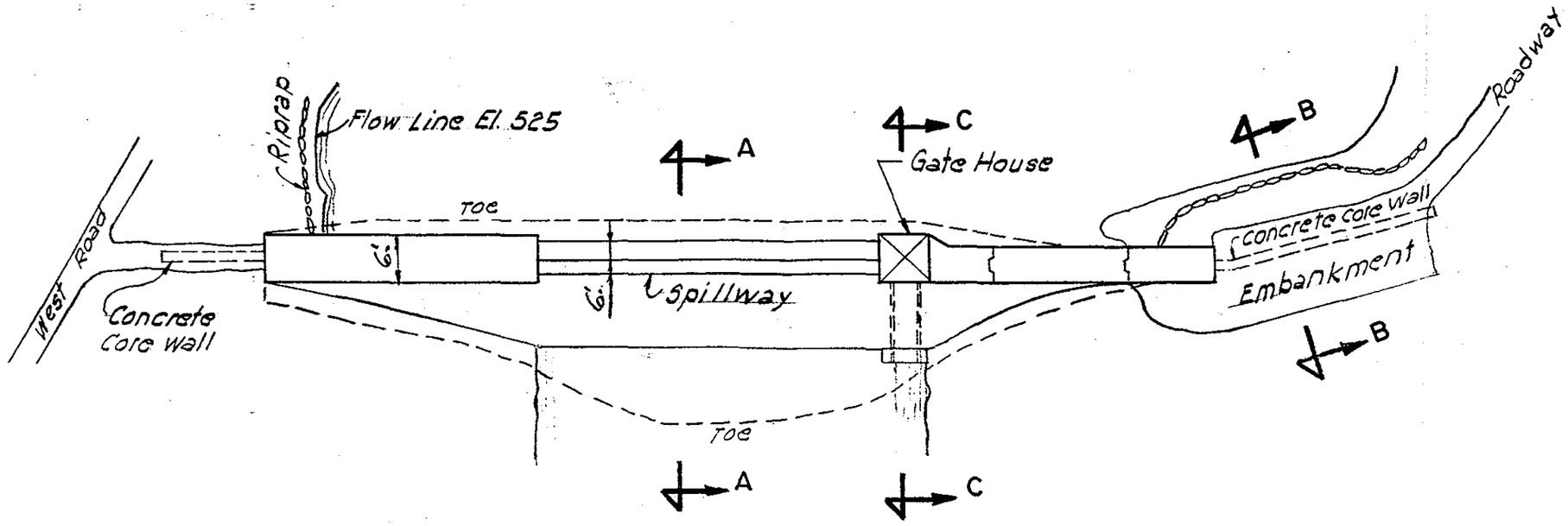
3. Guide Curves for the Probable Maximum Flood (PMF) for Regions of New England based on past Corps of Engineers' Studies; March, 1978.

4. Preliminary Guidance for Estimating Maximum Probable Discharges in Phase I Dam Safety Investigations; New England Division; Corps of Engineers; March, 1978.

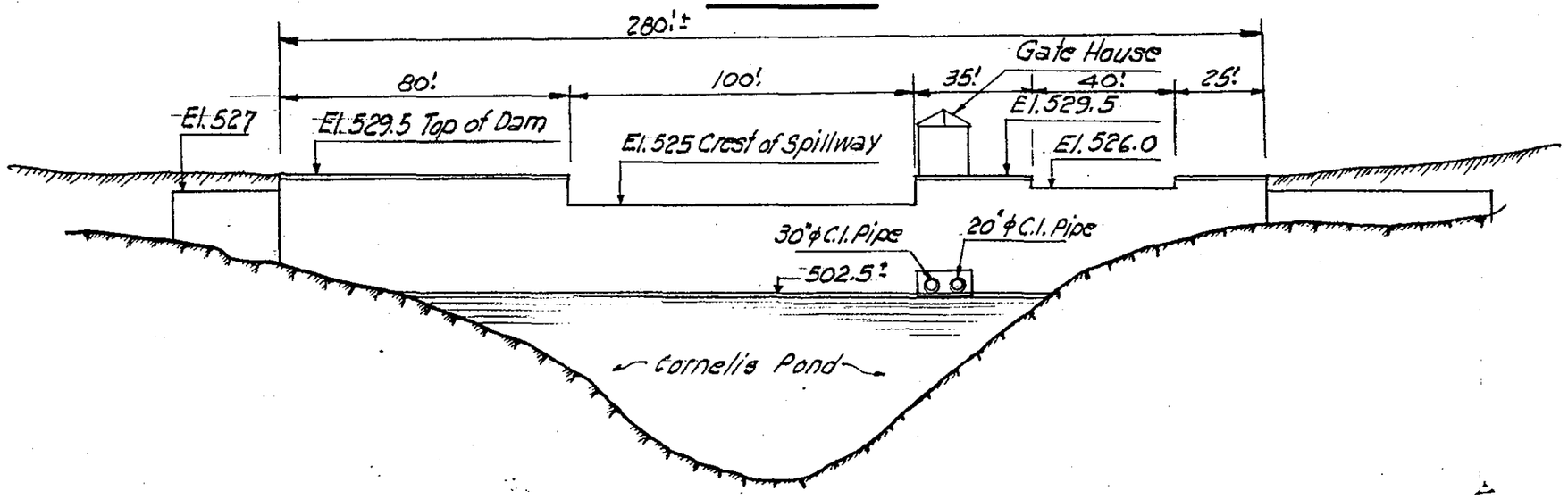
5. Rule of Thumb. Guidance for Estimating Downstream Dam Failure Hydrographs; Corps of Engineers; April, 1978.

6. Instrumentation for Measurement of Structural Behavior of Concrete Gravity Structures; U.S. Army; Corps of Engineers; EM 1100-2-4300; September, 1958.

7. Instrumentation of Earth and Rockfill Dams; U.S. Army, Corps of Engineers; EM 1100-2-1908; August, 1971.



PLAN



ELEVATION

NOTE: INFORMATION TAKEN FROM DRAWINGS SUPPLIED BY THE SCOVILLE MANUFACTURING COMPANY.

PLATE-1

STORCH ENGINEERS WETHERSFIELD, CONNECTICUT	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

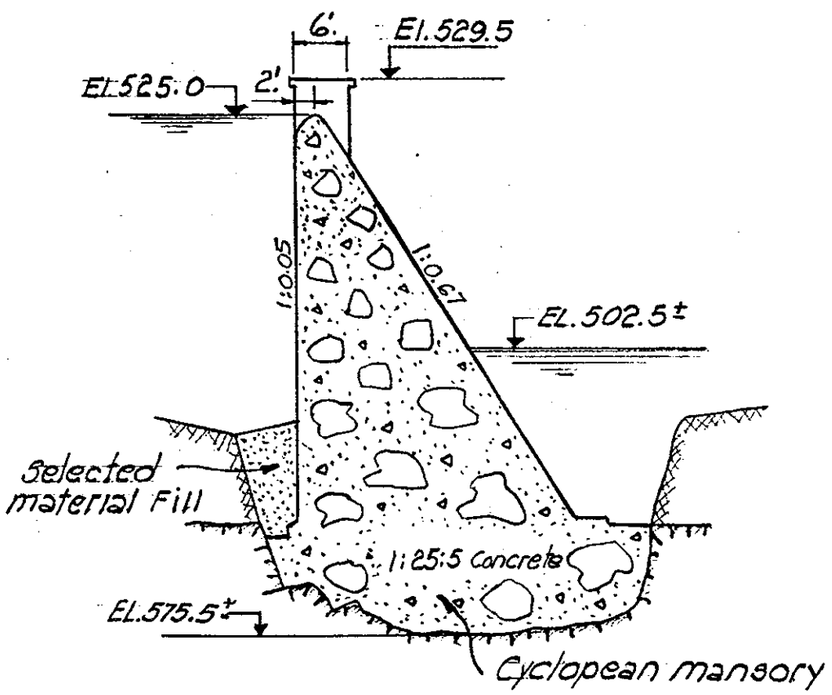
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

WOODTICK RESERVOIR DAM

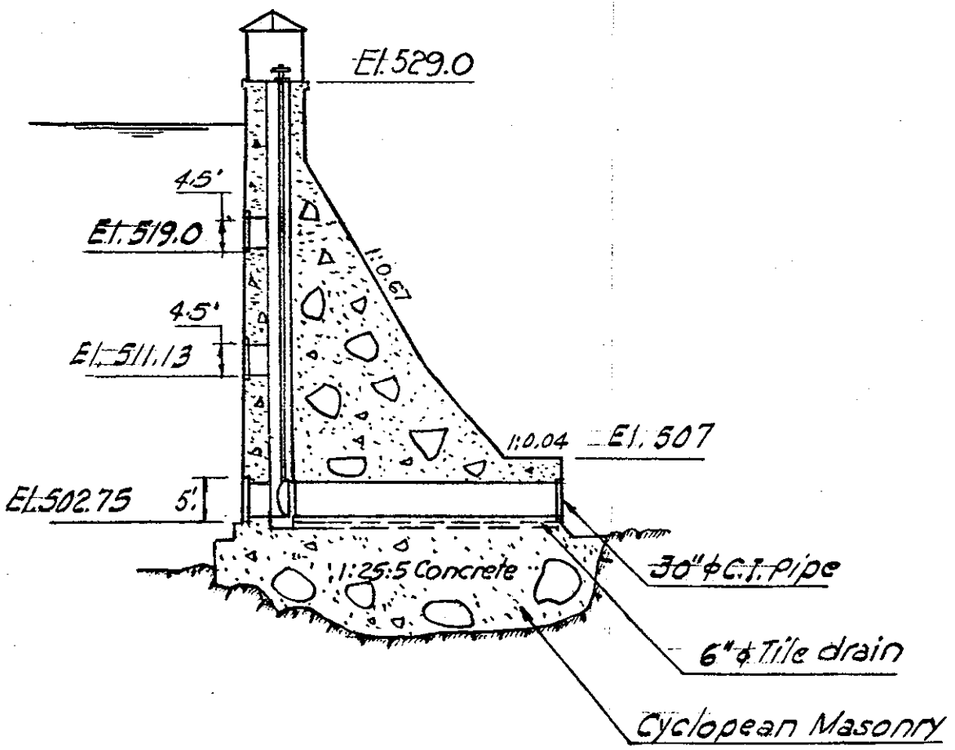
MAD RIVER — CONNECTICUT

SCALE: Not to Scale

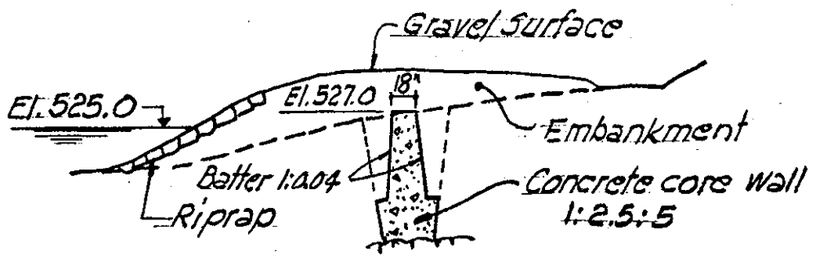
DATE : Nov. 1978



SECTION A-A



SECTION C-C



SECTION B-B

PLATE-2

STORCH ENGINEERS WETHERSFIELD, CONNECTICUT	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

WOODTICK RESERVOIR DAM

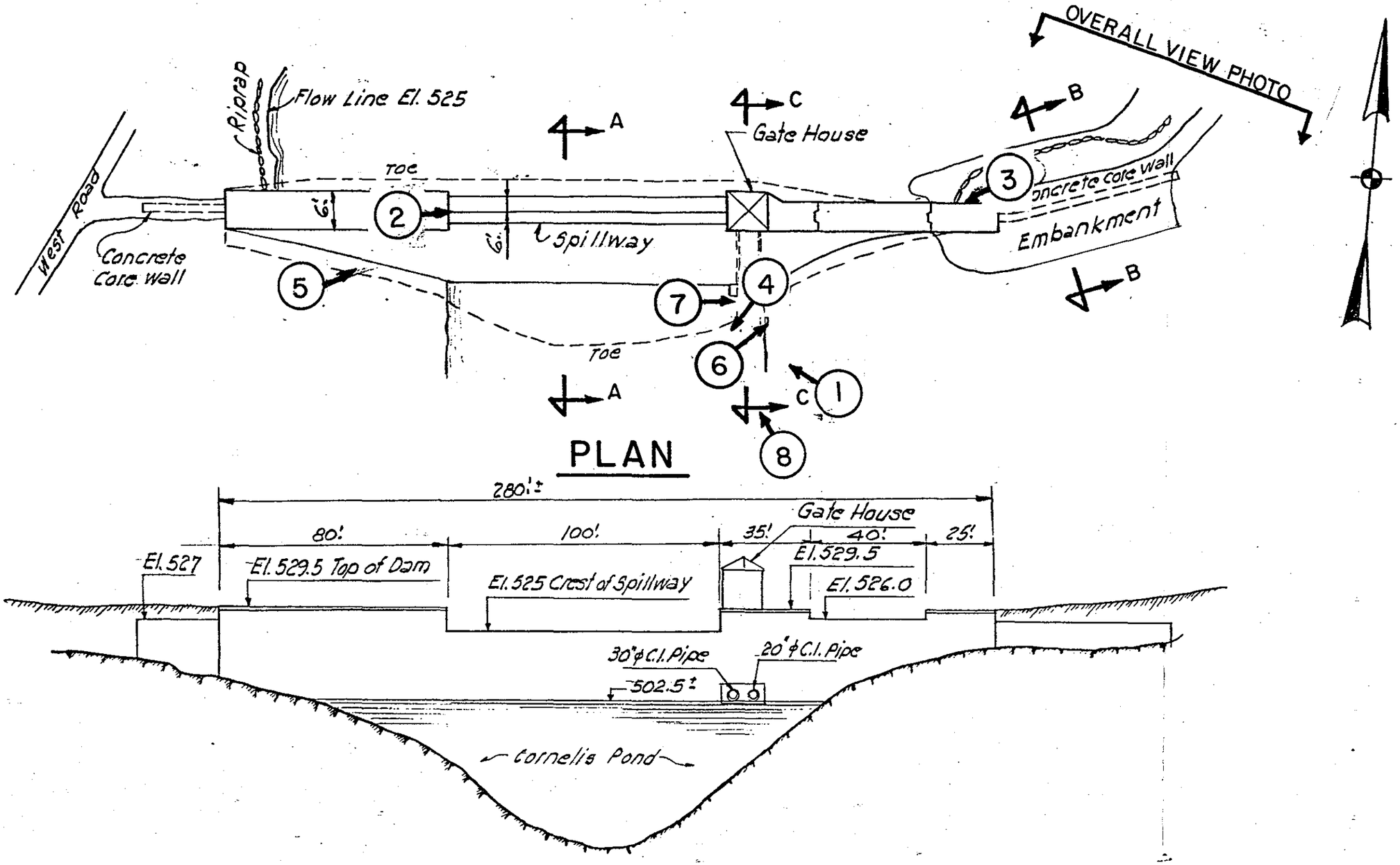
MAD RIVER — CONNECTICUT

SCALE: Not to Scale

DATE : Nov. 1978

APPENDIX C

PHOTO LOCATION PLAN	Plate 3
PHOTOGRAPHS	C-1 to C-4



ELEVATION

(2) → DENOTES PHOTO LOCATION

PLATE-3

STORCH ENGINEERS WETHERSFIELD, CONNECTICUT	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

WOODTICK RESERVOIR DAM

MAD RIVER — CONNECTICUT

SCALE: Not to Scale

DATE : Nov. 1978

PHOTO 2

CREST OF SPILLWAY LOOKING EAST

PHOTO 1

DOWNSTREAM FACE OF SPILLWAY

PHOTO 4

AT TOE OF DAM LOOKING DOWNSTREAM

PHOTO 3

CREST OF EMERGENCY SPILLWAY LOOKING WEST

PHOTO 6

SEEPAGE AT TOE OF DAM

PHOTO 5

SEEPAGE THROUGH BODY OF DAM

PHOTO 8

VIEW OF BLOWOFF AT THE TOE OF DAM

PHOTO 7

SEEPAGE OF DAM AT INTERFACE OF ROCK

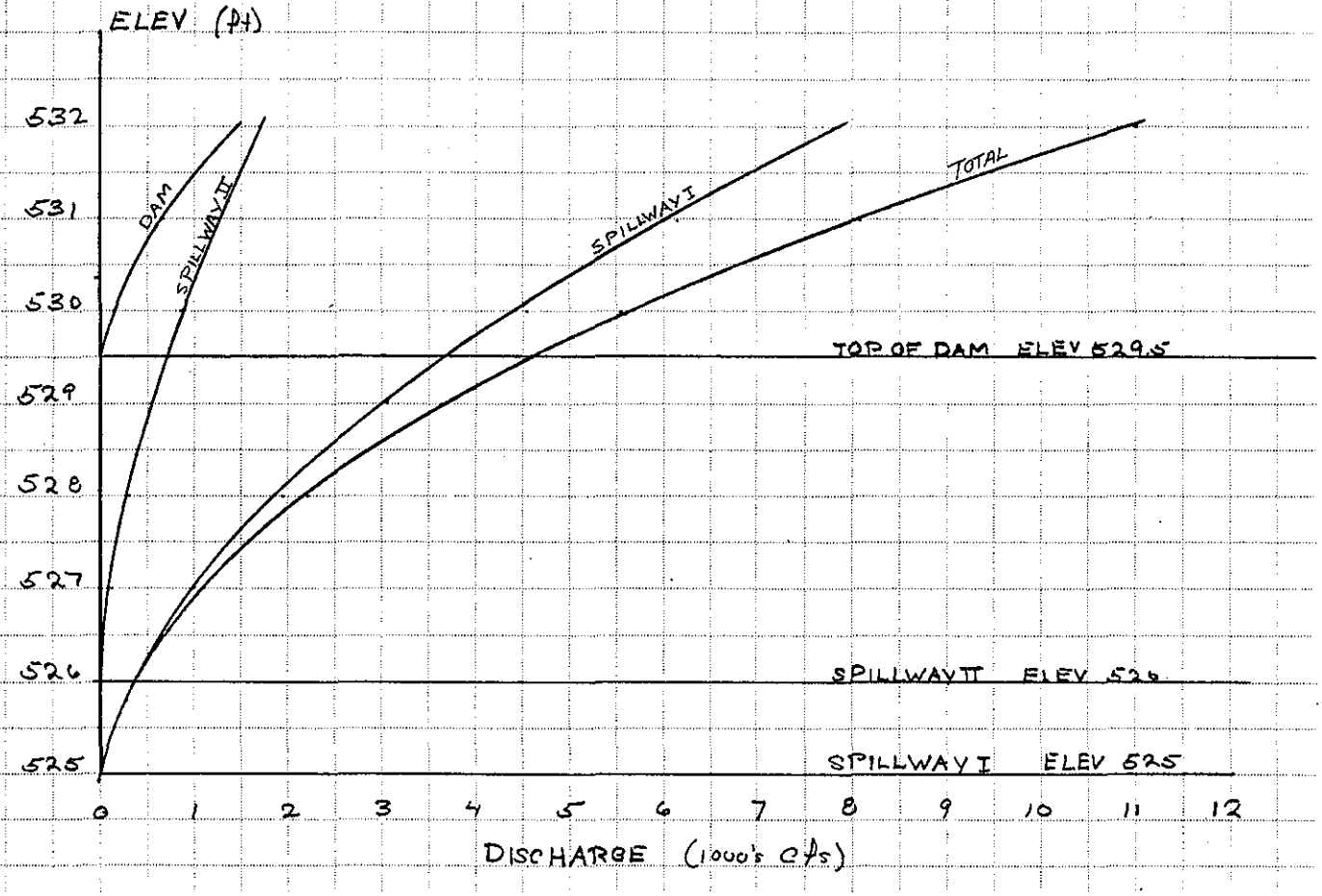
APPENDIX D

WOODTICK RESERVOIR DAM

STAGE DISCHARGE

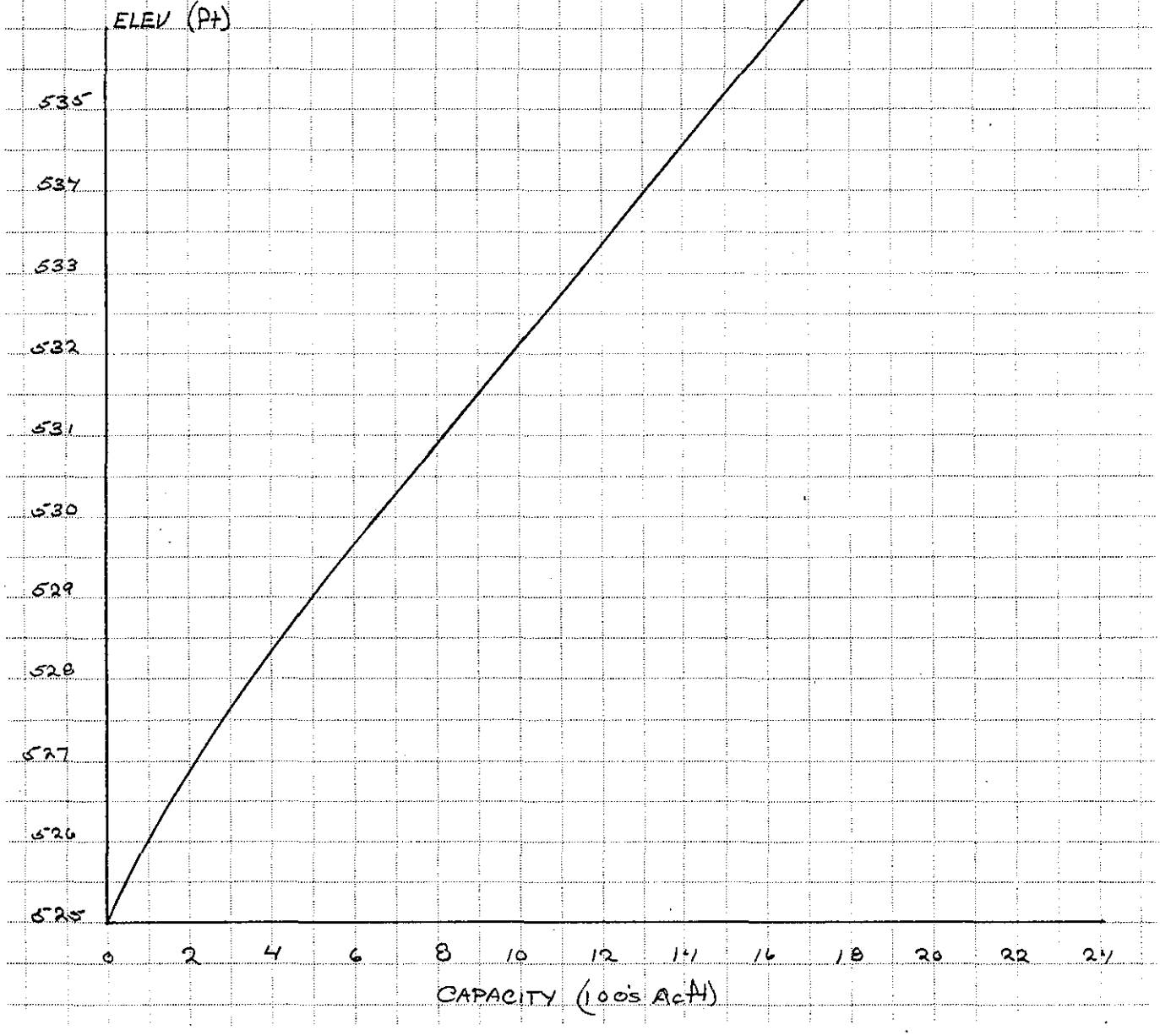
$Q = CLH^{3/2}$

	SPILLWAY I L=100'			SPILLWAY II L= 40'			DAM L= 140'			
ELEV	H	C	Q	H	C	Q	H	C	Q	Q_T
525	0		0	-		-	-		-	0
526	1	3.34	334	0		0	-		-	334
527	2	3.54	1000	1	2.68	107	-		-	1,107
528	3	3.71	1928	2	2.65	300	-		-	2,228
529	4	3.83	3064	3	2.66	553	-		-	3617
529.5	4.5	3.93	3752	3.5	2.68	702	0		0	4,454
530	5	4.06	4528	4	2.7	864	.5	2.6	128	5,520
531	6	4.17	6127	5	2.79	1250	1.5	2.65	682	8060
532	7	4.22	7815	6	2.90	1705	2.5	2.67	1478	11,000



WOODTICK RESERVOIR DAM
AREA - CAPACITY CURVE

ELEV	DEPTH	AREA	AVG AREA	VOL	Σ VOL (Ac-Ft)
526		130			0
	5		130	650	
530		130			650
	10		163.5	1635	
540		197			2285



WOODTICK RESERVOIR DAM
DETERMINATION OF SDF & PMF

DRAINAGE AREA - 8.54 SM

INFLOW - 1700 cfs/SM

$PMF_I = 1700(8.54) = 14520$ cfs

Determine the effect of surcharge storage on the Maximum Probable Discharge.

① $Q_{P1} = 14520$ cfs

② a. $H_1 = 533.1$ (ELEV)

b. $STOR_1 = 2.53''$

c. $Q_{P2} = Q_{P1}(1 - STOR/19) = 14520(1 - 2.53/19) = 12586$ cfs

③ a. $H_2 = 532.5'$

$STOR_2 = 2.3''$

b. $STOR_A = 2.42''$

$Q_{PA} = 14520(1 - 2.42/19) = 12670$ cfs

$H_A = 532.6$

$STOR = 2.27''$ OK

PMF = 12670 cfs

Capacity of the spillway when the pond elevation is @ the top of the dam.

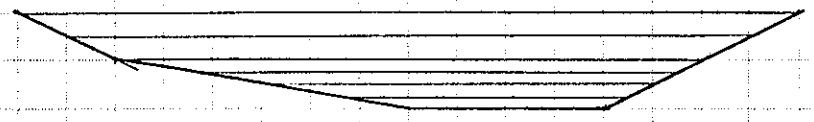
$Q = 4454$ cfs or 35 % of the PMF

Since this is a concrete dam water flowing 1' over the dam.

$Q = 6710$ cfs or 53 % of the PMF

WOODTICK RESERVOIR DAM

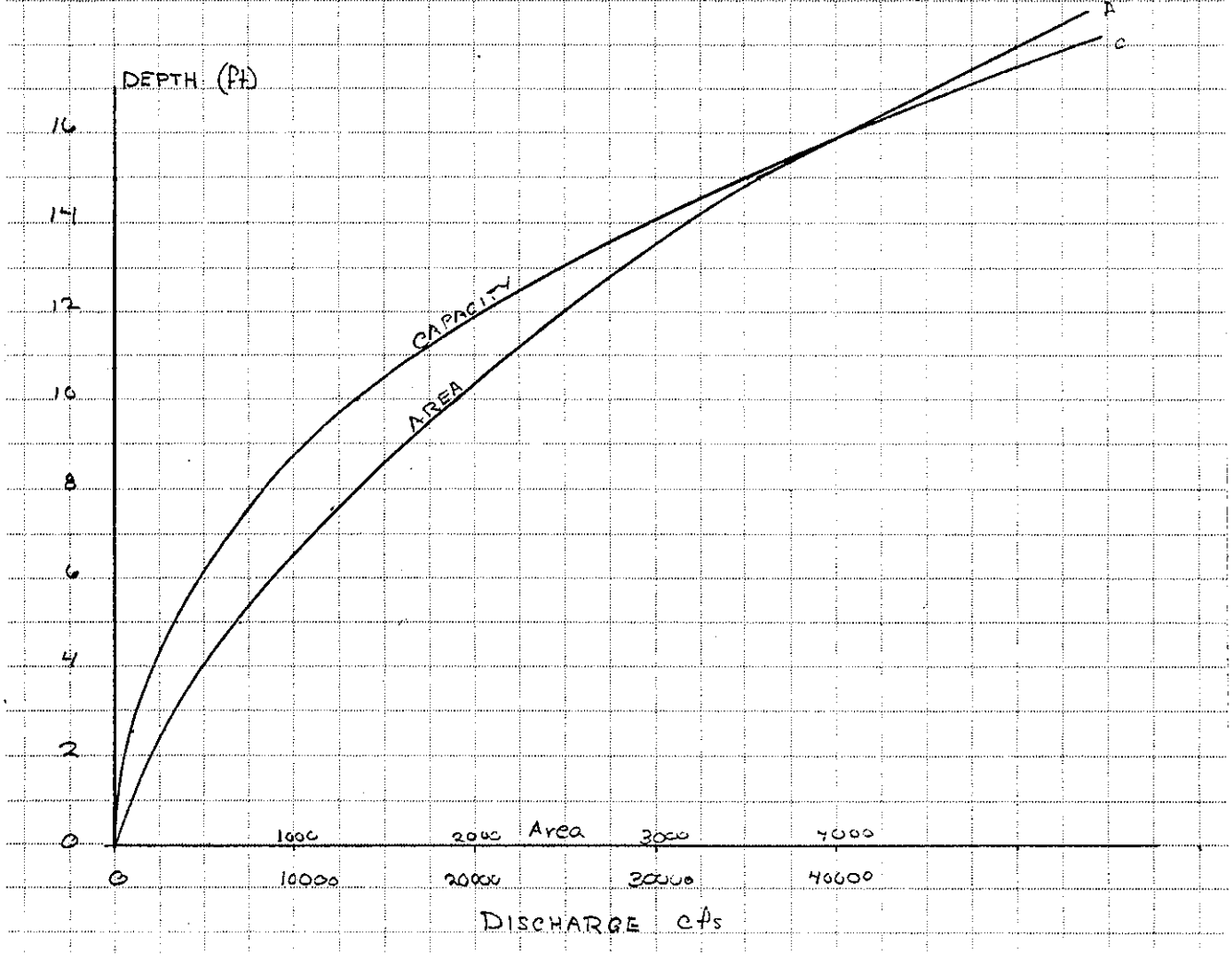
TYPICAL SECTION



SCALE
1" = 40'
1" = 100'

n = .05 S = .005

D	WP	A	H	$H^{2/3}$	$S^{1/2}$	V	Q
2.5	130	275	2.12	1.64	.07	3.411	938
5.0	200	700	3.5	2.3	.07	4.78	3349
7.5	270	1200	5.0	2.93	.07	6.09	7314
10	300	1900	6.33	3.48	.07	7.13	13558
15	355	3600	10.14	4.69	.07	9.75	35125
20	405	6000	14.8	6.03	.07	12.57	75270



"RULE OF THUMB" Guidance for Estimating Downstream Failure Hydrographs

SECTION I @ Dam

① $S = 2325$ Ac ft

② $Q_{P1} = 8/27\, W_b \sqrt{g}\, y^{3/2} = 8/27\,(200)\sqrt{32.2}\,(27)^{3/2} = 47{,}176$ cfs

SECTION II @ Hebrew Cem

④ a. $H_1 = 17.1'$ $A_1 = 41510$ ft^2 $L_1 = 10000$

$V_1 = 1035$ Ac ft

b. $Q_{P2} = 47{,}176\,(1 - 1035/2325) = 26{,}175$ cfs

c $H_2 = 13.2'$ $A_2 = 2850$

$A_a = 3680$ $V_a = 8415$ Ac ft

$Q_{P2} = 47176\,(1 - 8415/2325) = 30{,}000$ cfs

SECTION III @ City Mills Ponds

④ a. $H_2 = 14'$ $A_2 = 3200$ $L_3 = 10{,}000'$

$V_3 = 734$ Ac ft

b. $Q_{P3} = 30{,}000\,(1 - 734/2325) = 20{,}530$ cfs

$H_3 = 12'$ $A_3 = 2500$

$A_a = 2850$ $V_3 = 654$ Ac ft

$Q_{P3} = 30000\,(1 - 654/2325) = 21560$ cfs

$H_3 = 12.2$ $A_3 = 2606$ ft^2

SECTION IV @ Naugatuck River

④ a. $H_3 = 12'$ $A_3 = 2600$ $L_4 = 12500'$

$V_4 = 746$ Ac ft

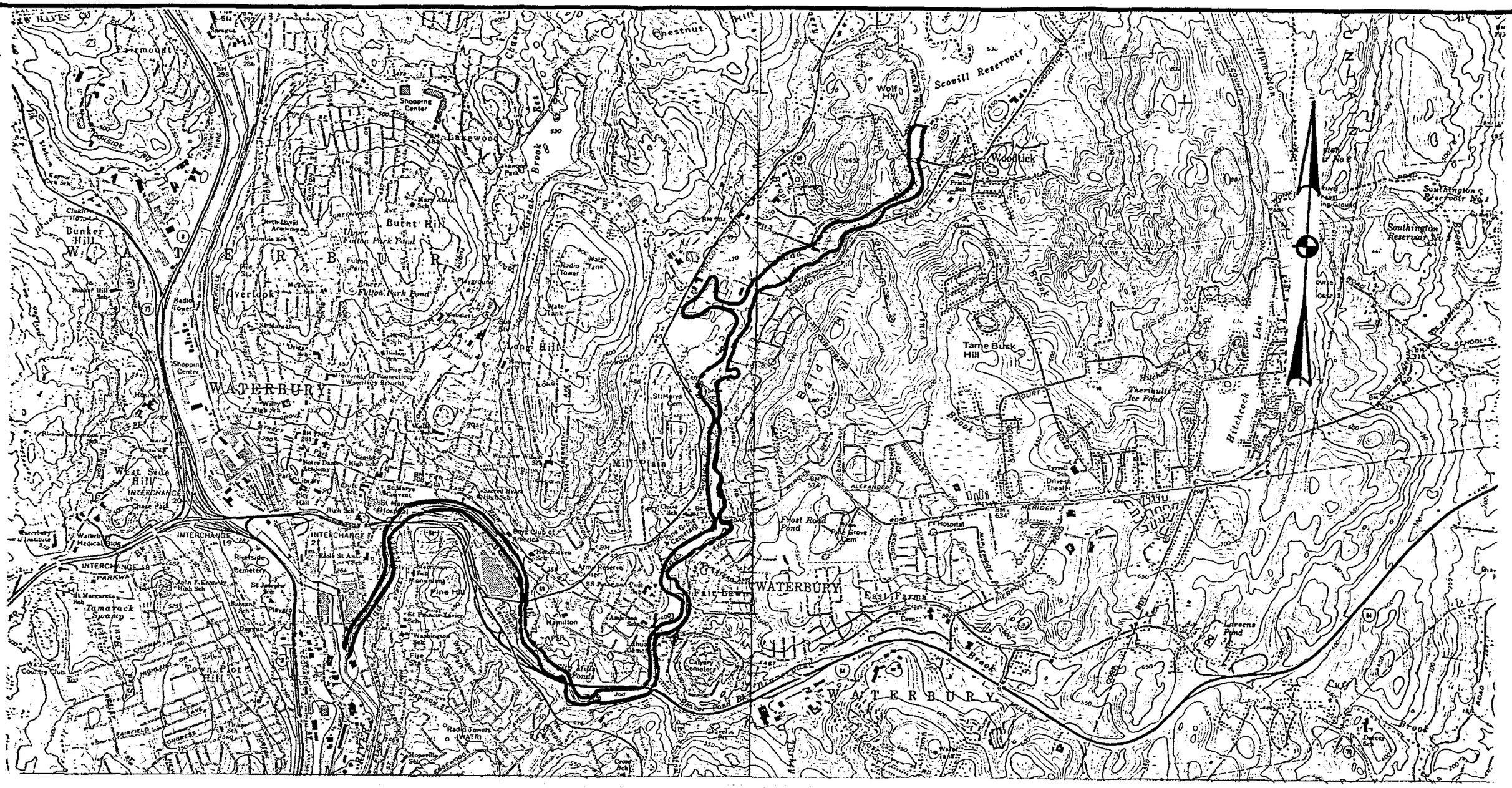
b. $Q_{P4} = 21560\,(1 - 746/2325) = 14640$ cfs

$H_4 = 10.4$ $A_4 = 2000$

$A_a = 2300$ $V_4 = 660$ Ac ft

$Q_{P4} = 21560\,(1 - 660/2325) = 15410$ cfs

$H_4 = 10.7'$



SCALE 1:24000

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 5 0 1 KILOMETER

CONTOUR INTERVAL 10 FEET

DATUM IS MEAN SEA LEVEL

LEGEND

DENOTES LIMITS OF FLOODING IN CASE OF DAM FAILURE

PLATE-4

STORCH ENGINEERS WETHERSFIELD, CONNECTICUT	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

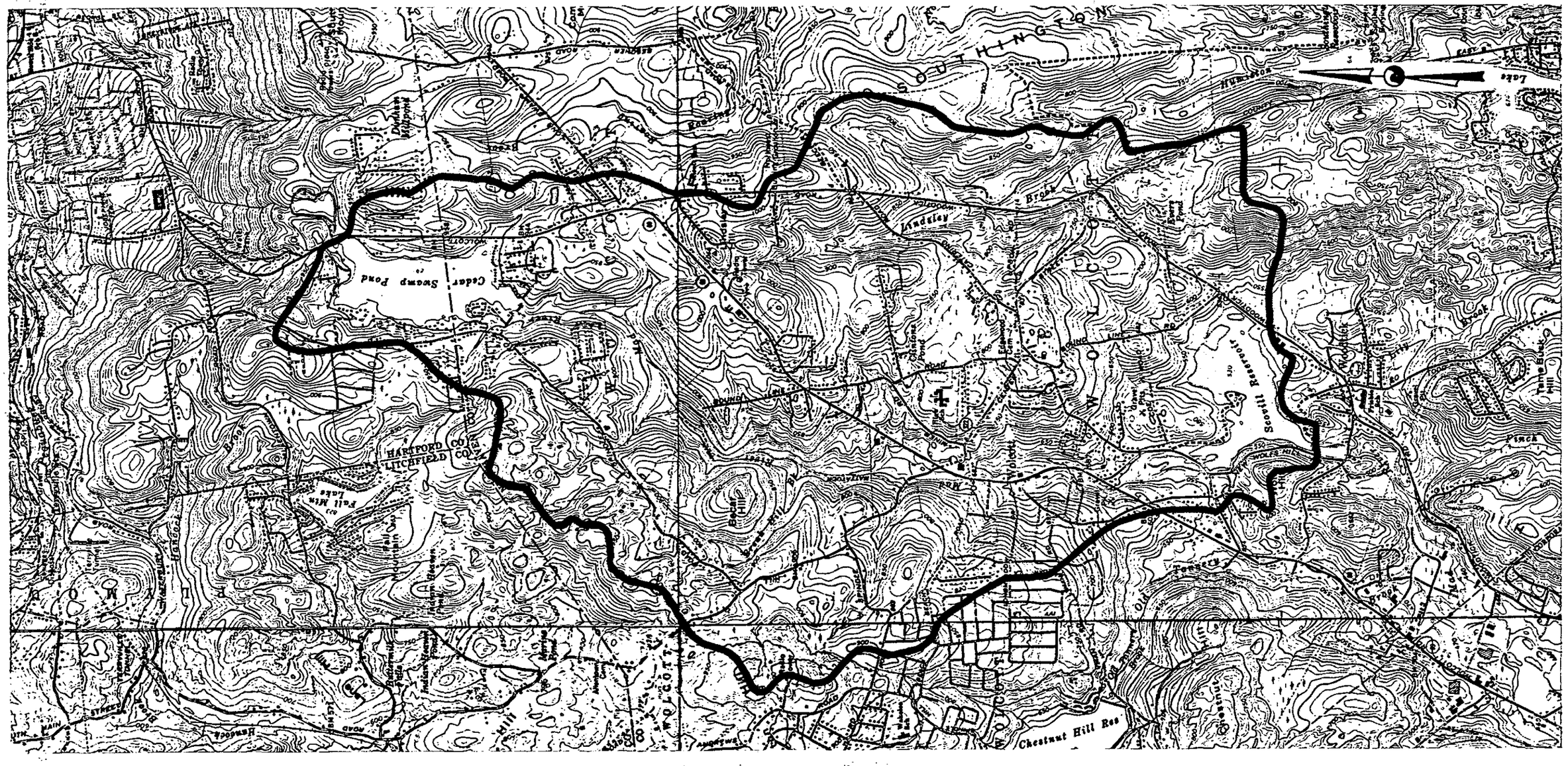
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

WOODTICK RESERVOIR DAM

MAD RIVER — CONNECTICUT

SCALE: AS SHOWN

DATE : Nov. 1978



DRAINAGE AREA MAP

LEGEND

——— DENOTES DRAINAGE AREA

FROM U.S.G.S. QUAD. SHEET

SOUTHINGTON, CONNECTICUT

SCALE

½ 0 1 MILE

PLATE- 5

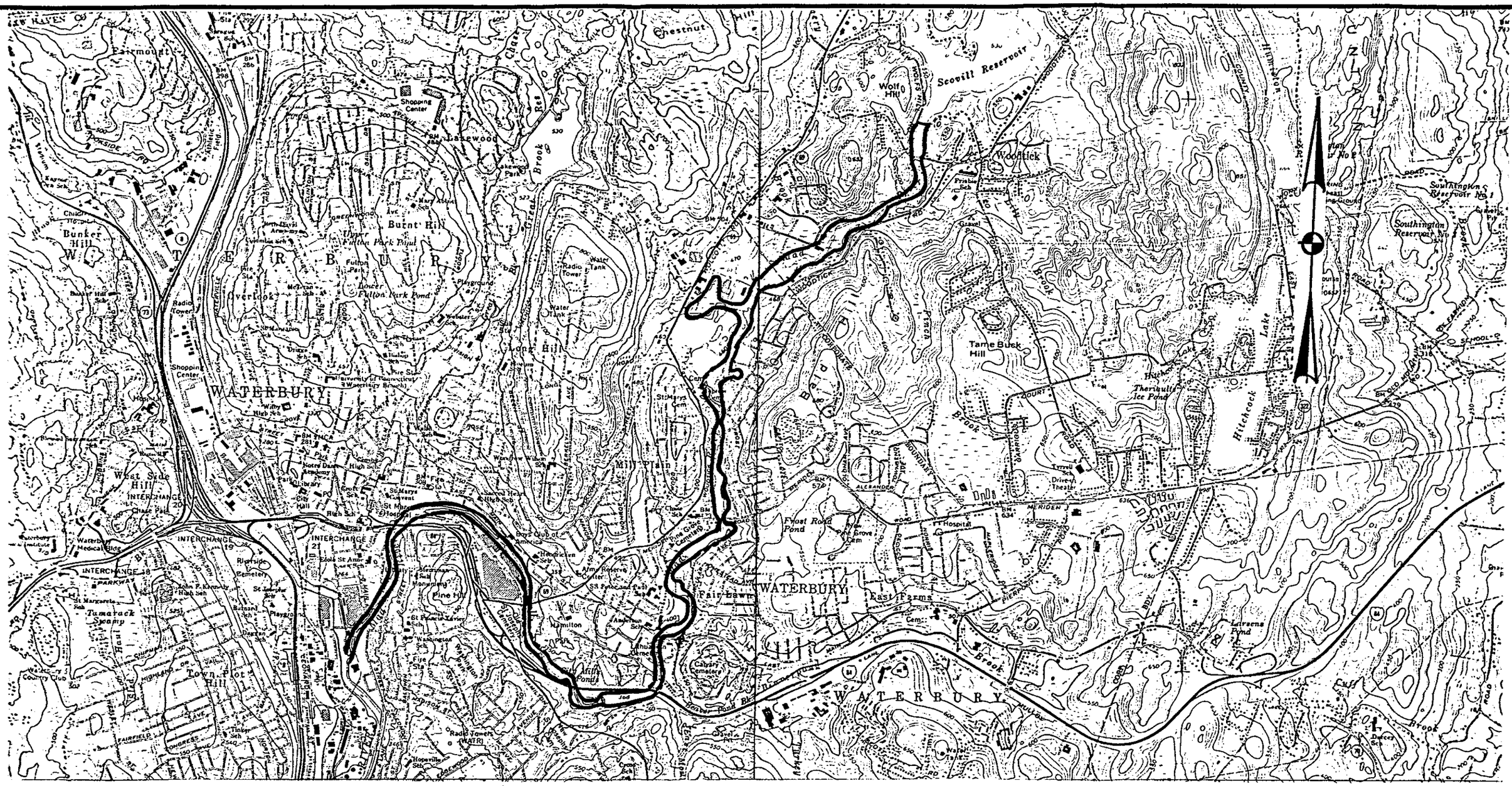
STORCH ENGINEERS WETHERSFIELD, CONNECTICUT	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

WOODTICK RESERVOIR DAM

MAD RIVER — CONNECTICUT

SCALE:	AS SHOWN
DATE :	NOV. 1978



SCALE 1:24000

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 5 0 1 KILOMETER

CONTOUR INTERVAL 10 FEET

DATUM IS MEAN SEA LEVEL

LEGEND

DENOTES LIMITS OF FLOODING IN CASE OF DAM FAILURE

PLATE-4

STORCH ENGINEERS WETHERSFIELD, CONNECTICUT	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

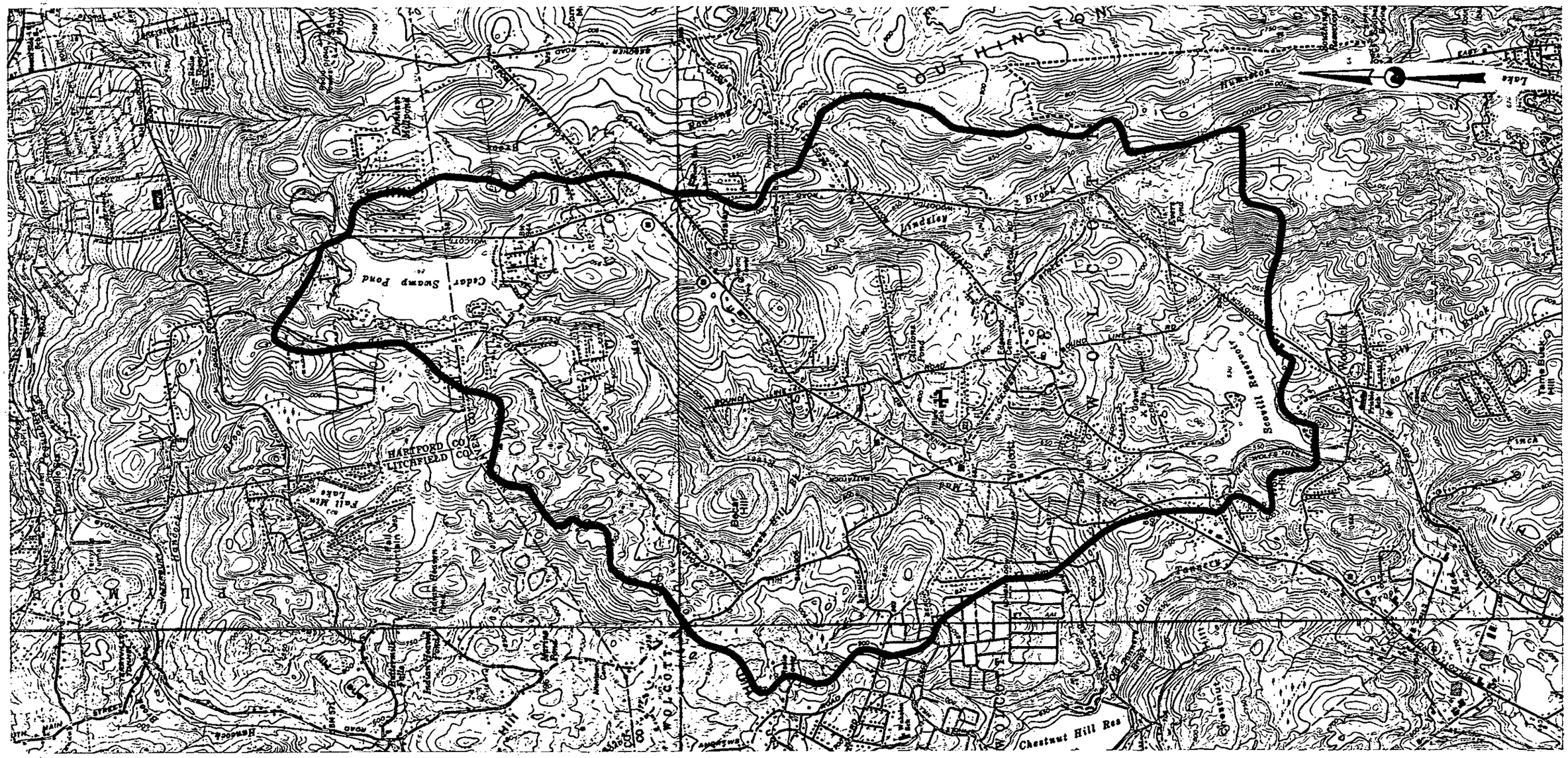
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

WOODTICK RESERVOIR DAM

MAD RIVER — CONNECTICUT

SCALE: AS SHOWN

DATE : Nov. 1978



DRAINAGE AREA MAP

PLATE- 5

LEGEND

DENOTES DRAINAGE AREA

FROM U.S.G.S. QUAD. SHEET

SOUTHINGTON, CONNECTICUT

SCALE

½ 0 1MILE

STORCH ENGINEERS WETHERSFIELD, CONNECTICUT	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

WOODTICK RESERVOIR DAM

MAD RIVER — CONNECTICUT

SCALE: AS SHOWN

DATE : NOV. 1978

APPENDIX E

INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS